**PHYSICAL CHEMISTRY OF AN HETEROGENEOUS MEDIUM: TRANSPORT PROCESSES INTO COMET NU-CLEI.** N. Bouziani , F.P. Fanale , *Hawai'i Institute of Geophysics and Planetology,School of Ocean and Earth Science and Technology,University of Hawai'i at Manoa, Honolulu, HI 96822, USA, naceur@kahana.pgd.hawaii.edu.*

We present here a transient transport model of a binary gas through a porous comet nucleus. We discuss the modeling of this process in earlier cometary models and compare our results with one of them. We give the relationship between the time required to reach steady state $t_c$ and the porous nucleus permeability, it is shown that $t_c$ is very short ($\sim$ few seconds to very few hours) compared to the rotation time ($t_R \sim$ few hours to few days). We show that the gas separation factor $\alpha = f(P)$, (P, the total pressure), passes through a maximum. We use this to propose a preliminary study of an indirect method to get insight into the internal physical heterogeneity by using the separation factor. It is shown that our approach considerably improves the modeling of mass transport in porous comet nuclei.